

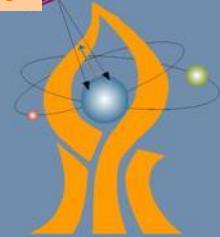
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Analysis of Large Aeolian (wind-blown) Bedforms using the Spaceborne Radar Topography Mission (SRTM) data

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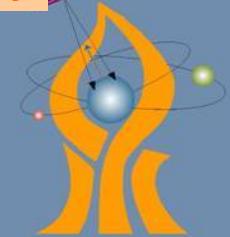


Dry lands of Earth

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- 40% of the land masses are defined as drylands (UNEP, green regions)
- 15% of the landmasses are mantled by aeolian deposits, mostly in semi-arid and hyper arid regions





Ergs

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- Sand seas, also called “Ergs” after the Arabic name for dune fields, are regional accumulations of windblown sand that contain
 - numerous
 - very large **dunes** (Draas)
 - **compound** or **complex** form.

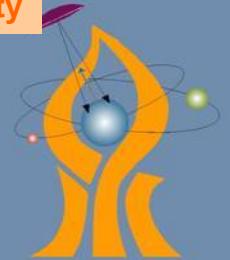
defined by Wilson 1973

Global studies

Wilson 1973

McKee 1979



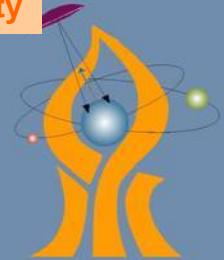


Ergs

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- Areas of active ergs as marked by Wilson 1973



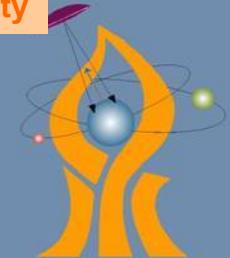


Dunes and aeolian forms

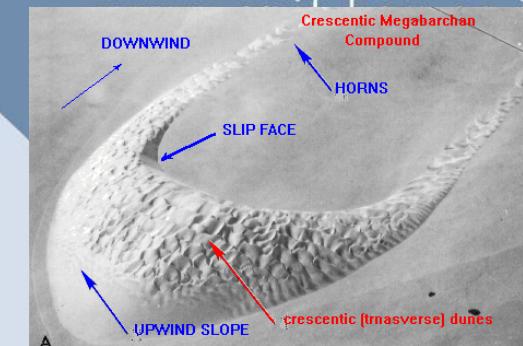
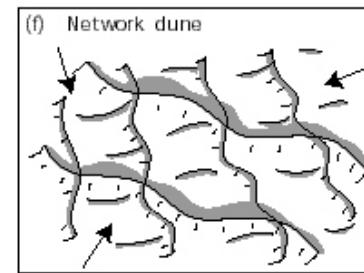
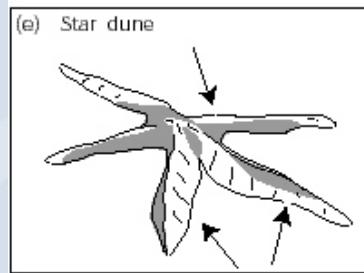
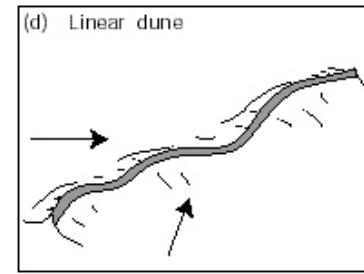
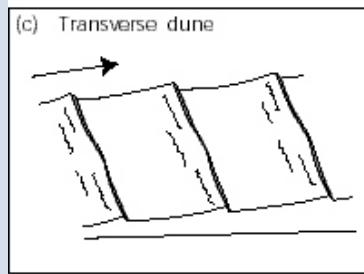
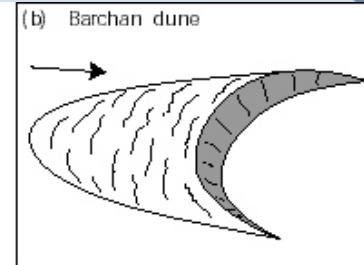
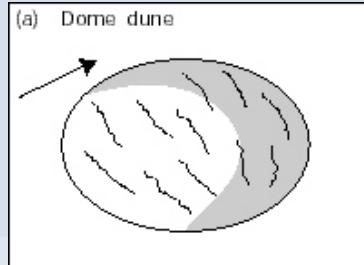
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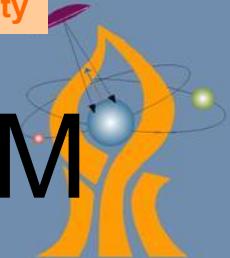
- By scale
 - Mega dunes
 - Compound dunes
 - Simple dunes
 - Ripples
- By type
 - Linear dunes
 - Transverse dunes (or ridges)
 - Star dunes





Dune types





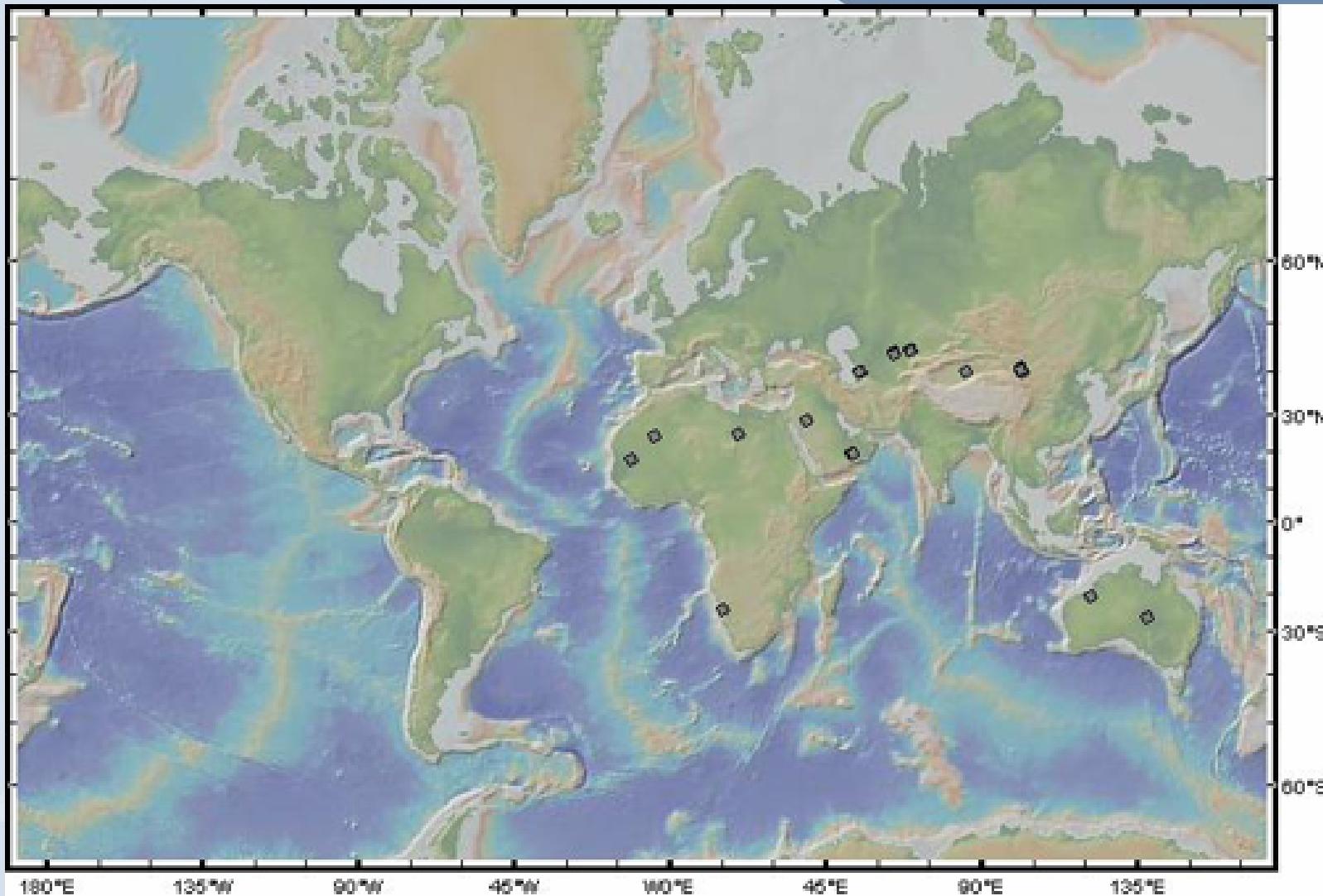
Draas best observed in SRTM

- Large, widely-spaced mega-dunes, generally known as “Draas.”
- Bagnold (1941) recognized such features in North Africa, calling them “whalebacks”
- Simple dunes are more common but not well observed in SRTM



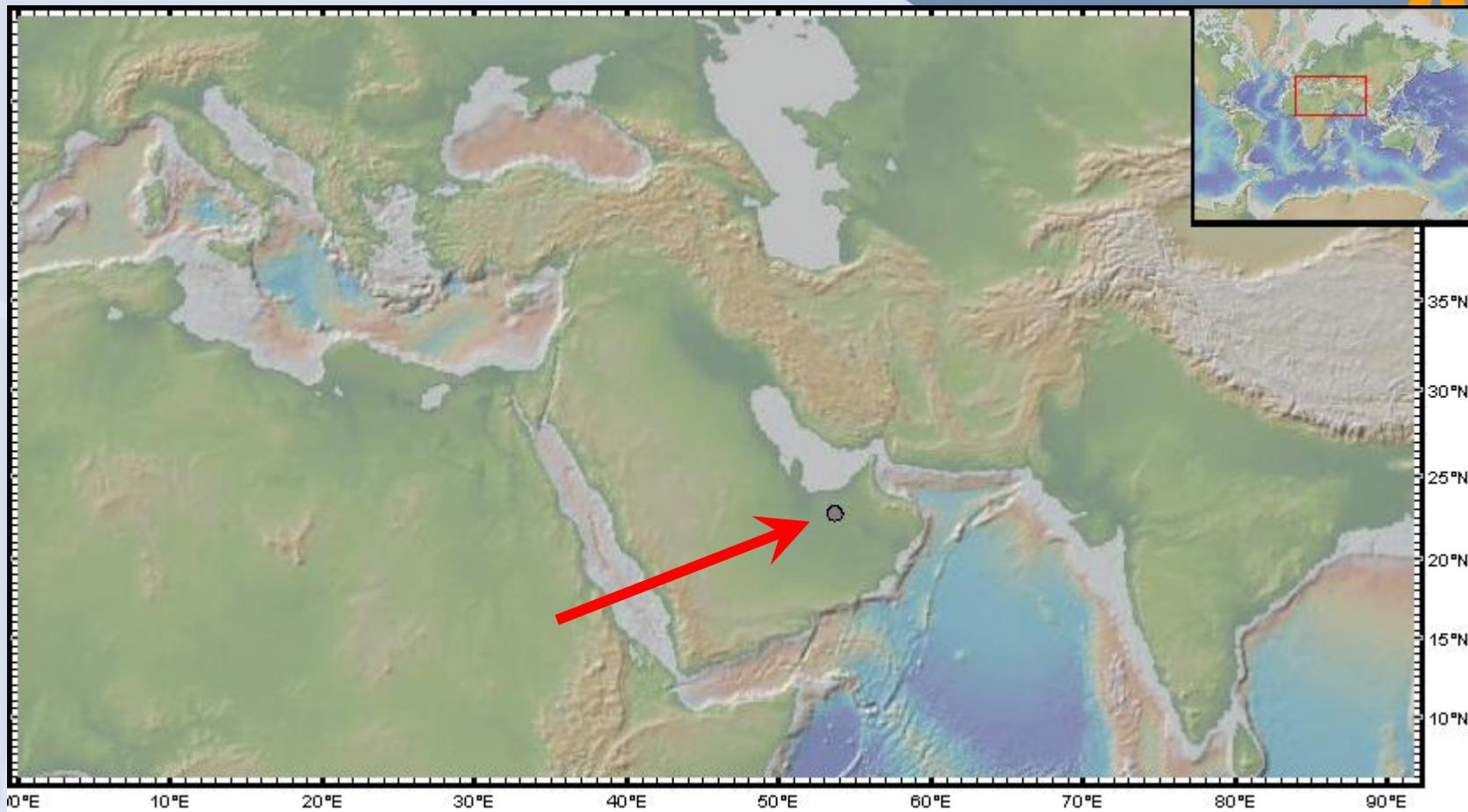
Namib mega dune

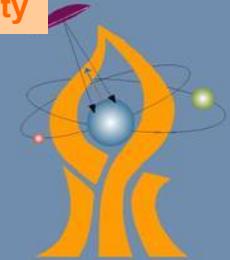
Main areas studied





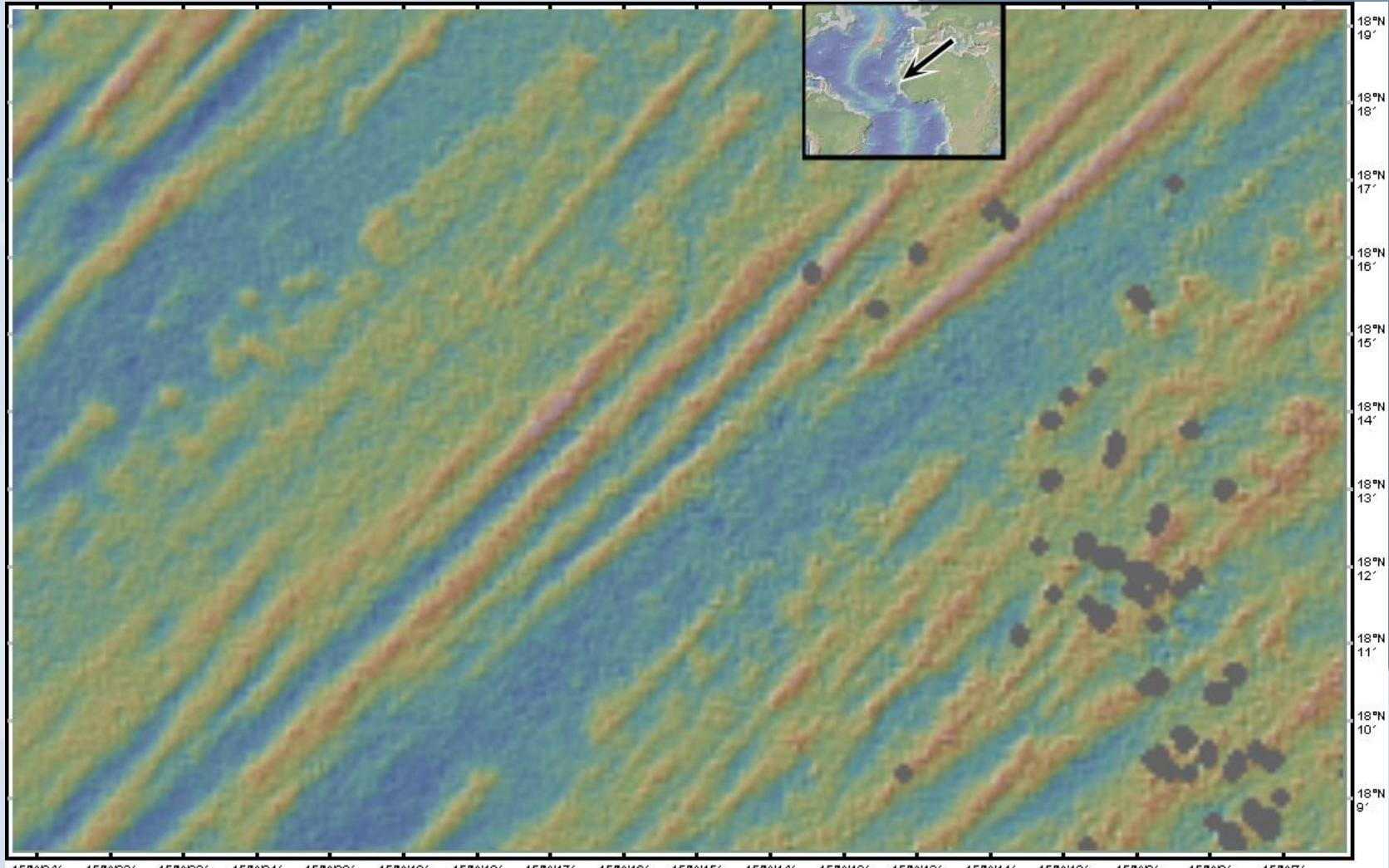
Rub-al-Khali



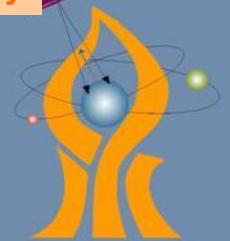


West-Africa

- Linear Dunes



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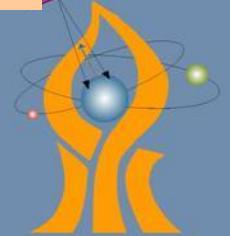


West Africa

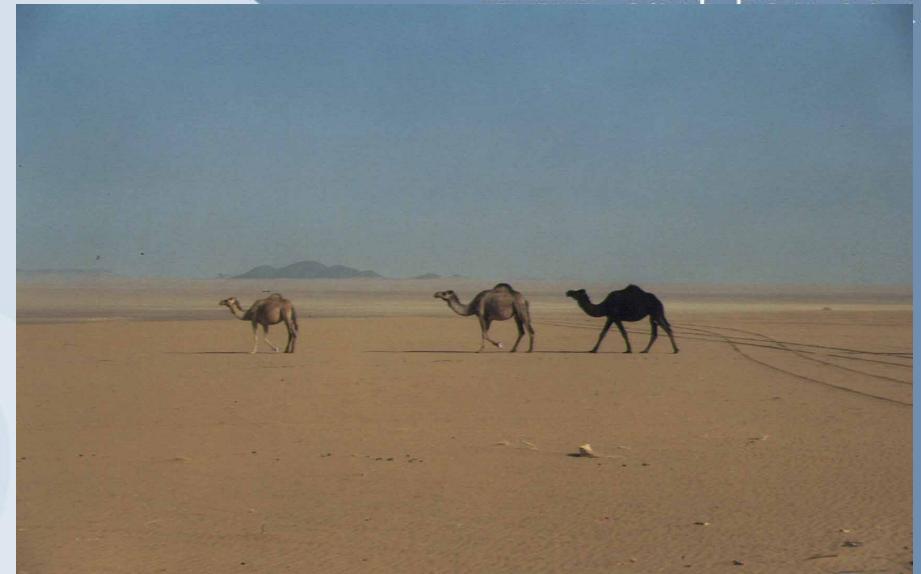
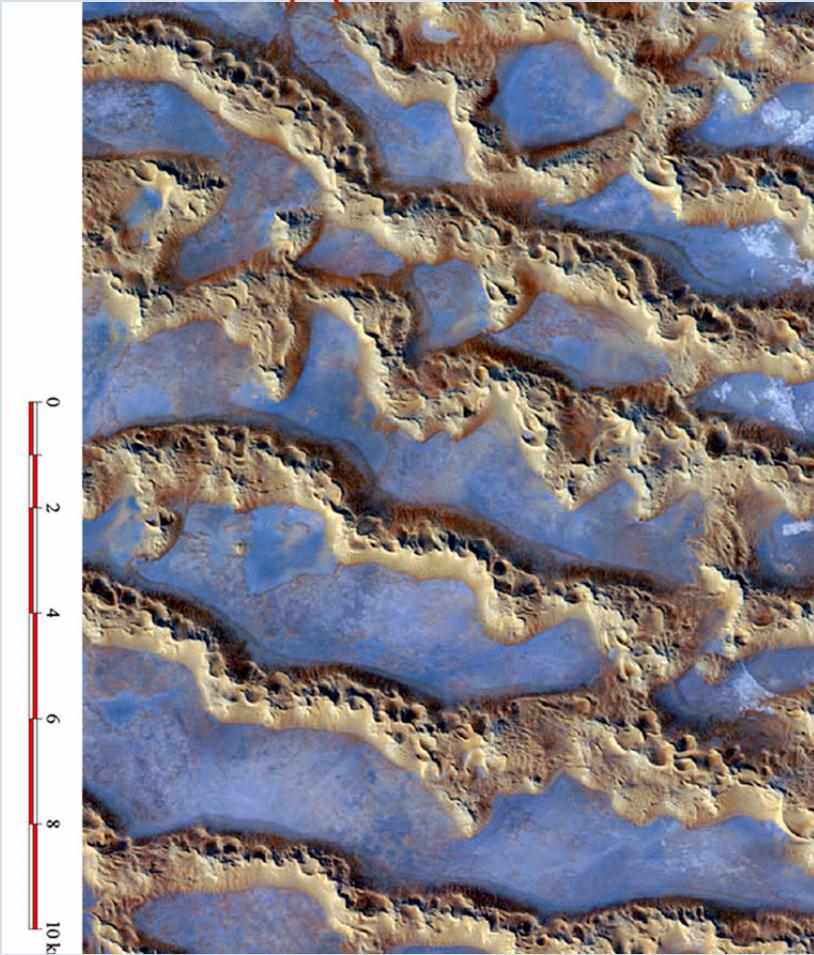
Tuning-fork dunes

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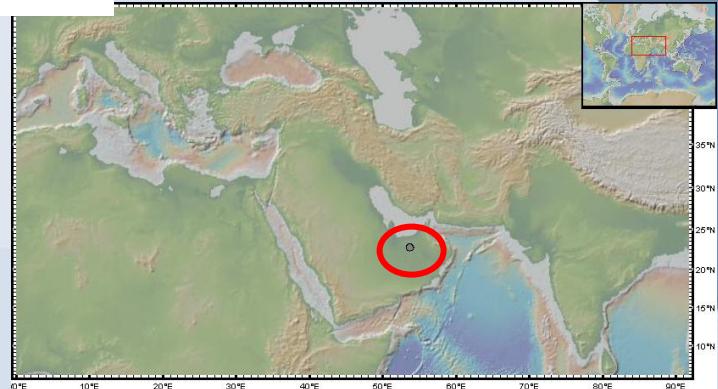


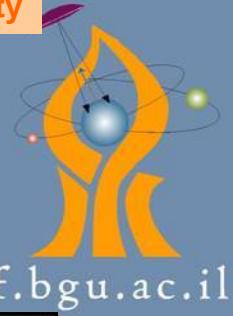


Rub-al-Khali



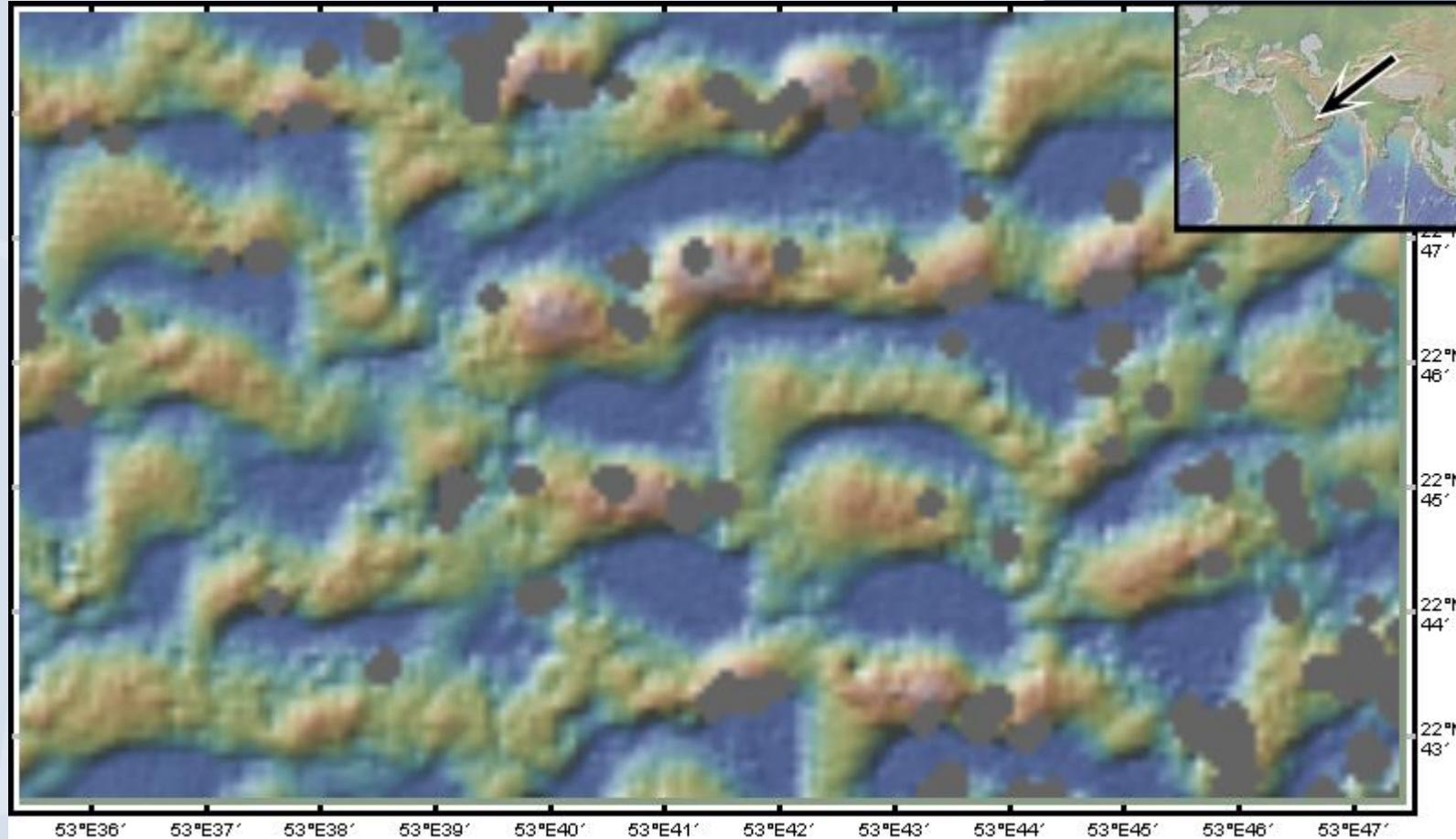
ASTER

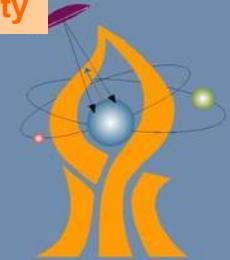




Rub-al-Khali

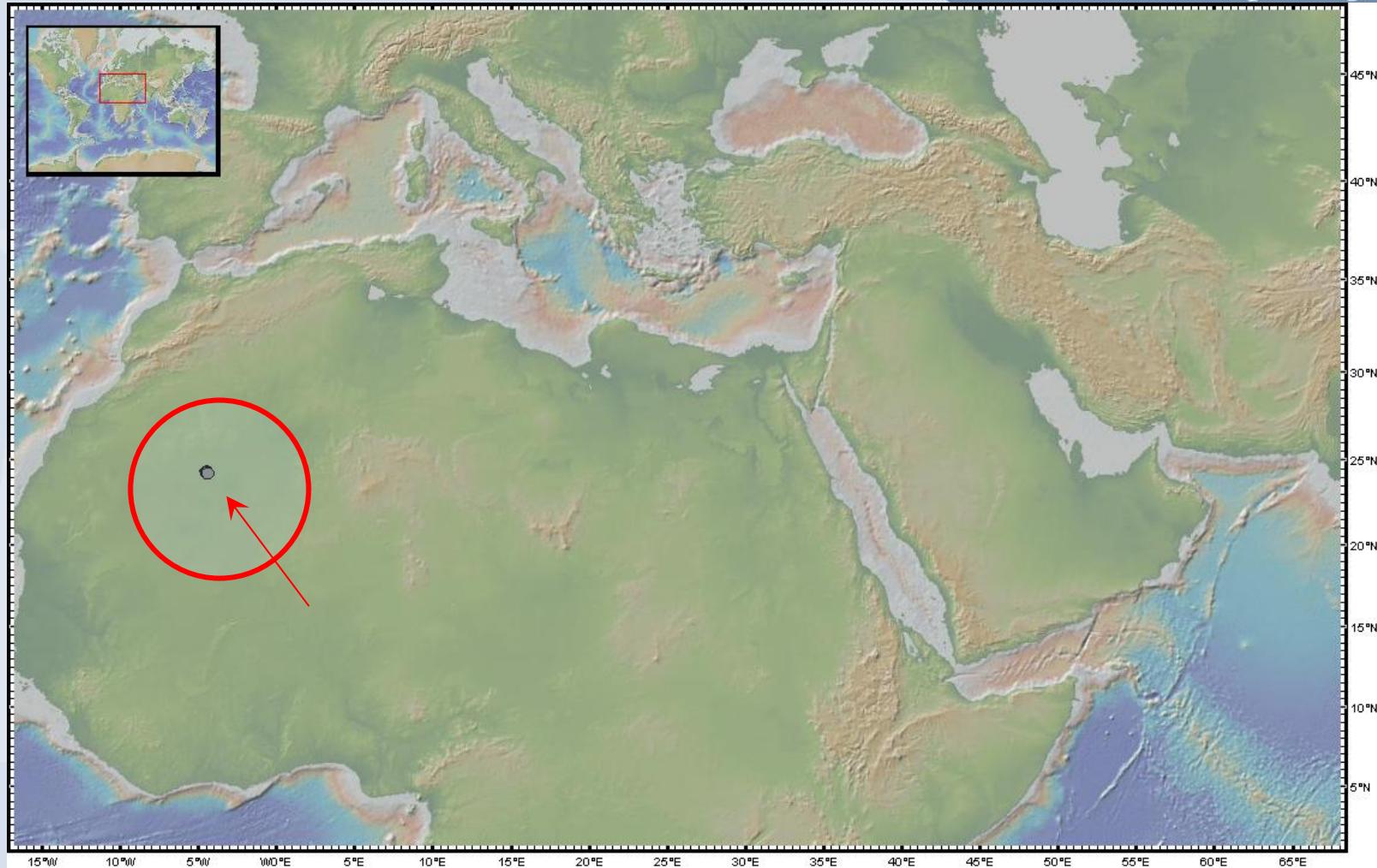
- Transverse ridges and Mega Barchans

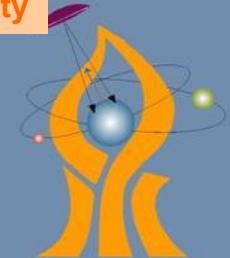




Erg Shech-Aradar

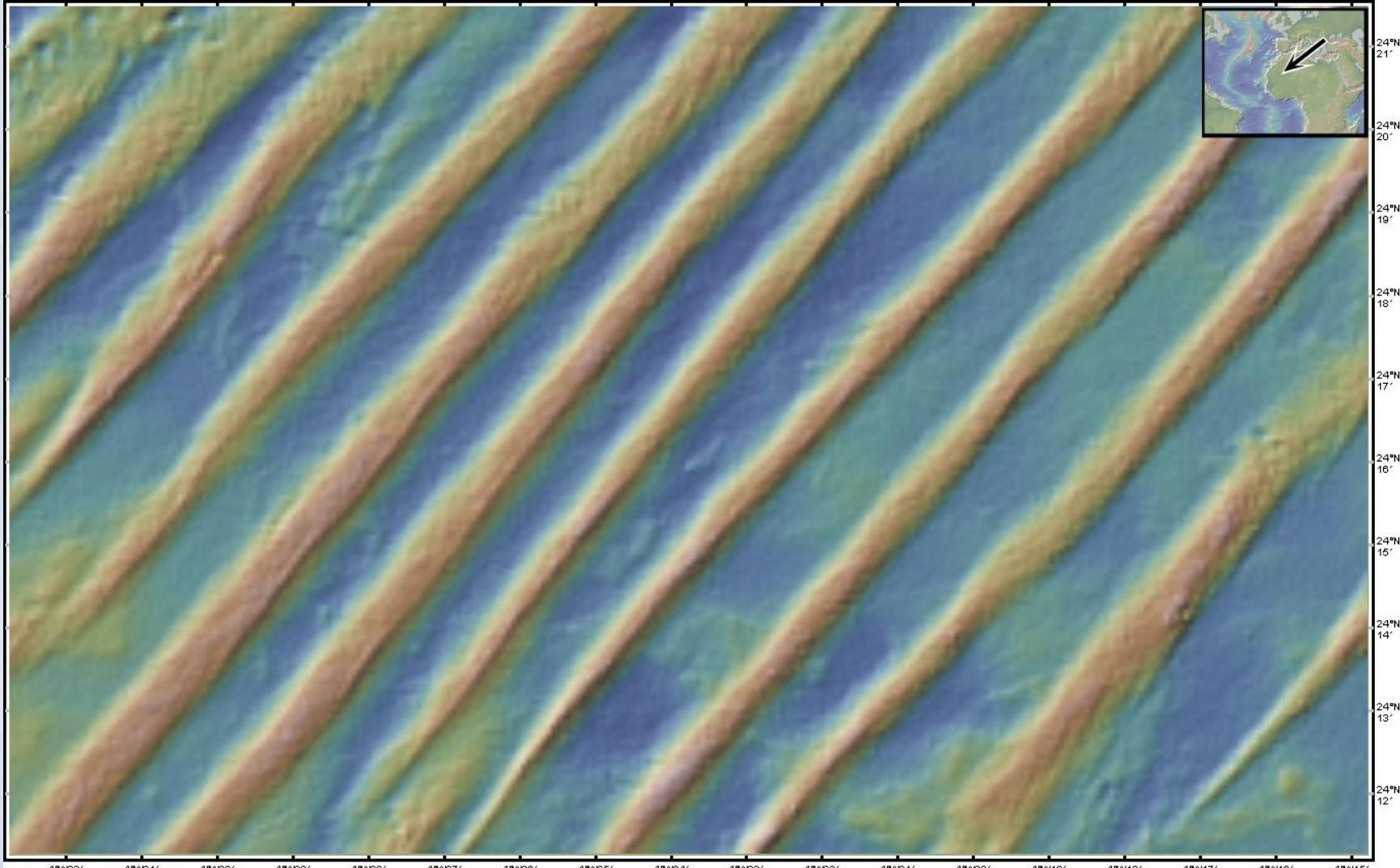
www.epif.bgu.ac.il

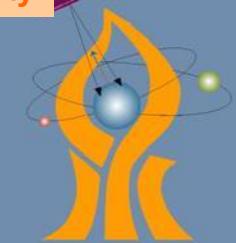




Erg Shech-Aradar Linear ridges

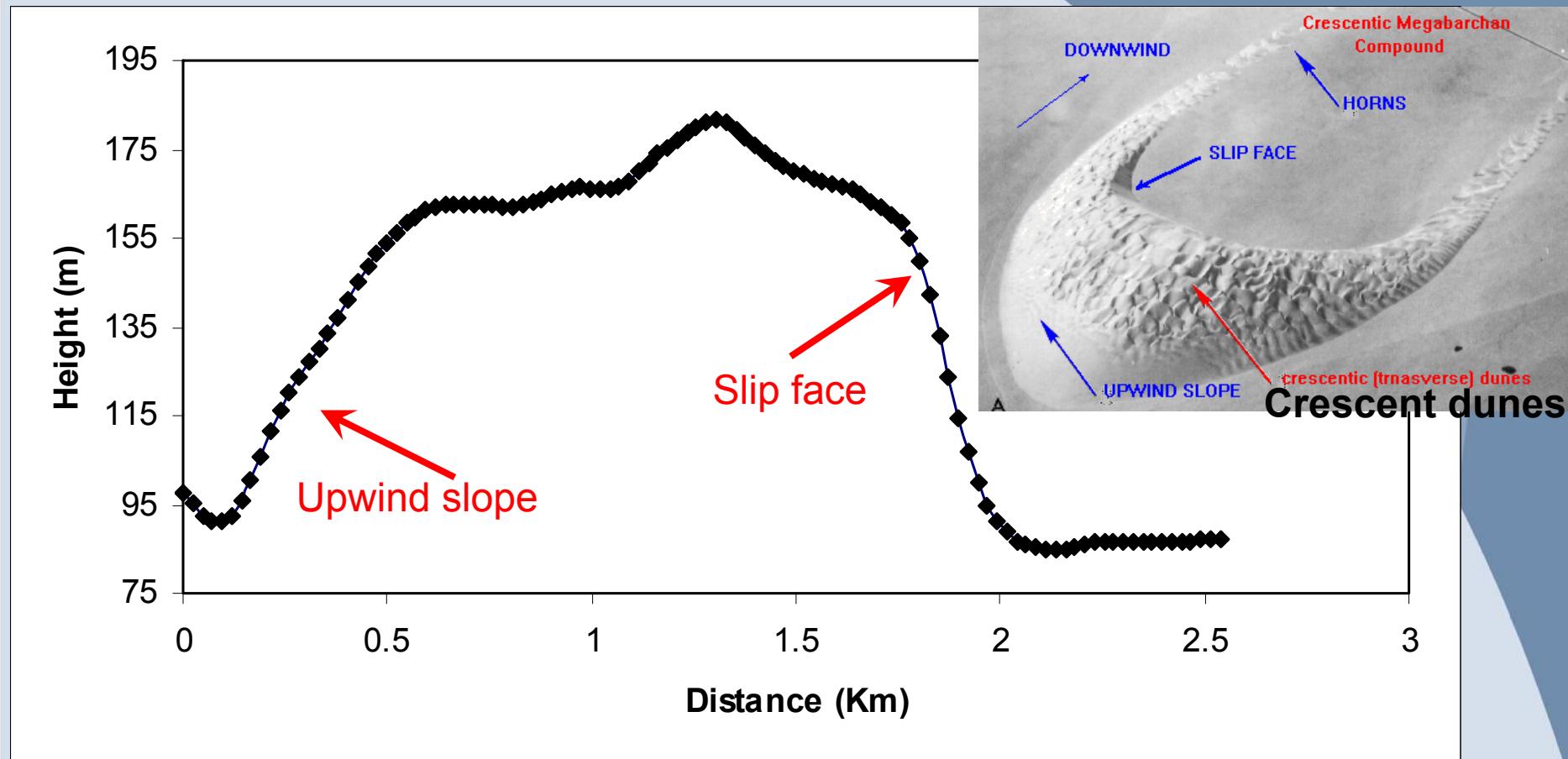
www.enif.bgu.ac.il

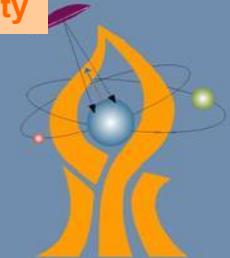




Draas in Rub-al Khali Mega Barchans

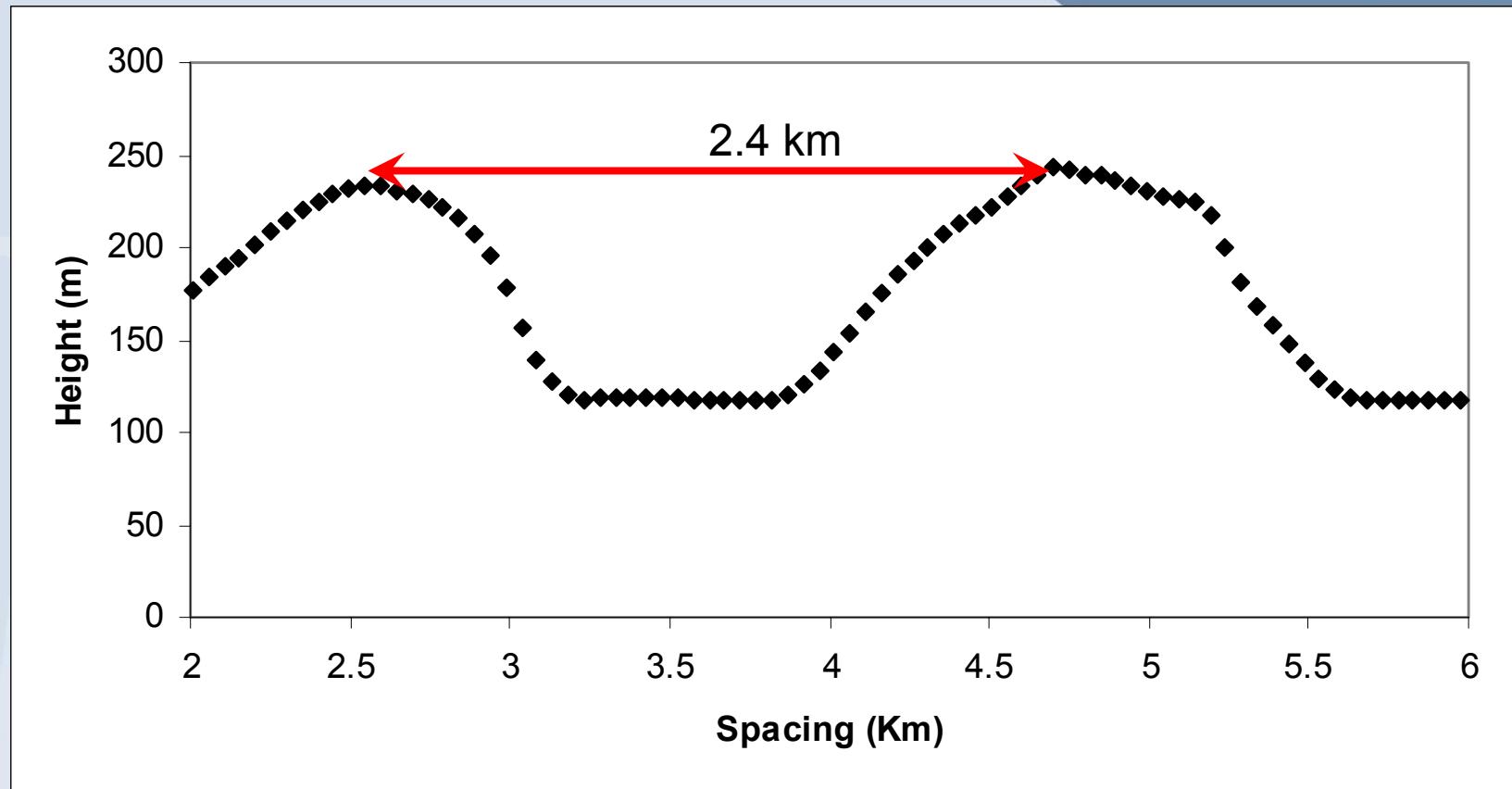
www.epif.bgu.ac.il

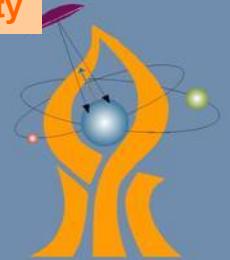




Wavelength of the dune

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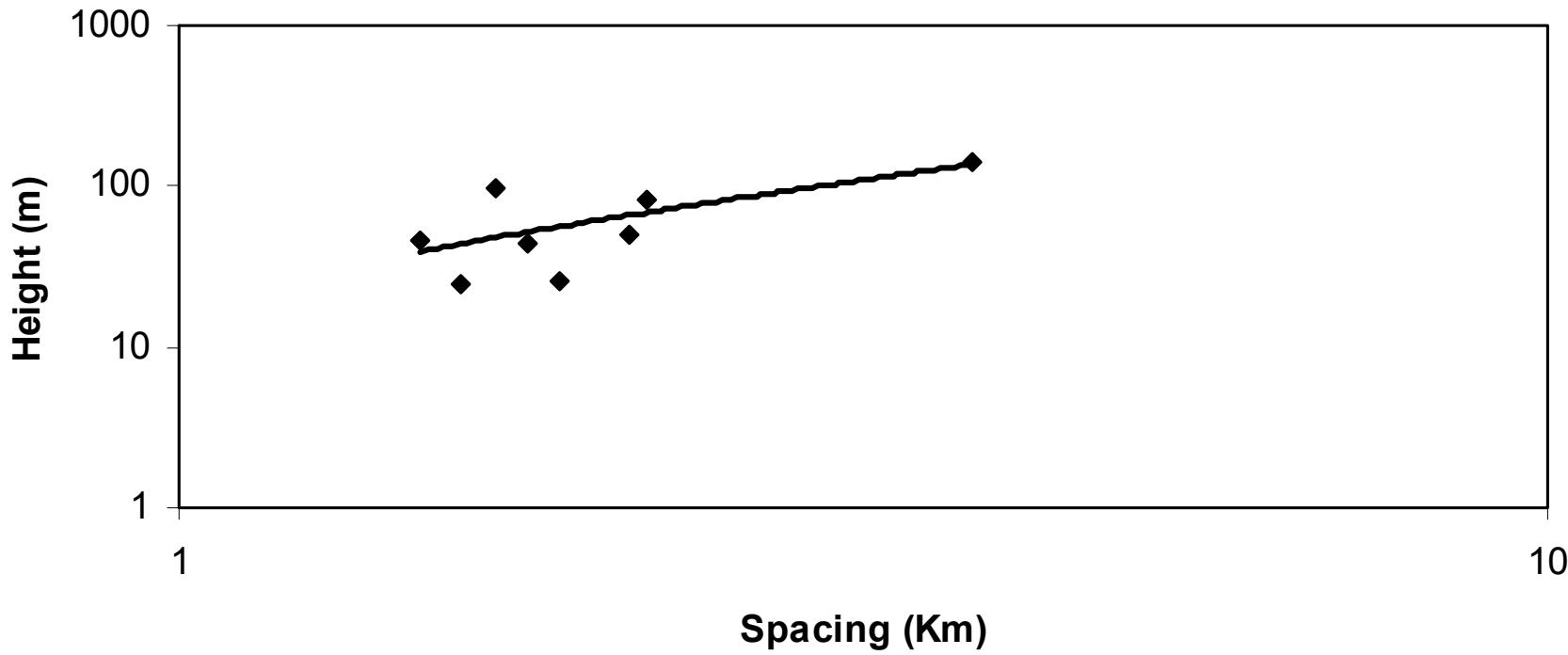


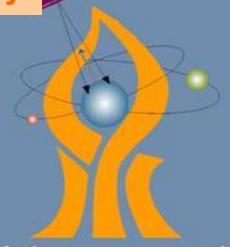
Results

Total >55,000 data points
Summarized into Ergs

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Transverse Dunes



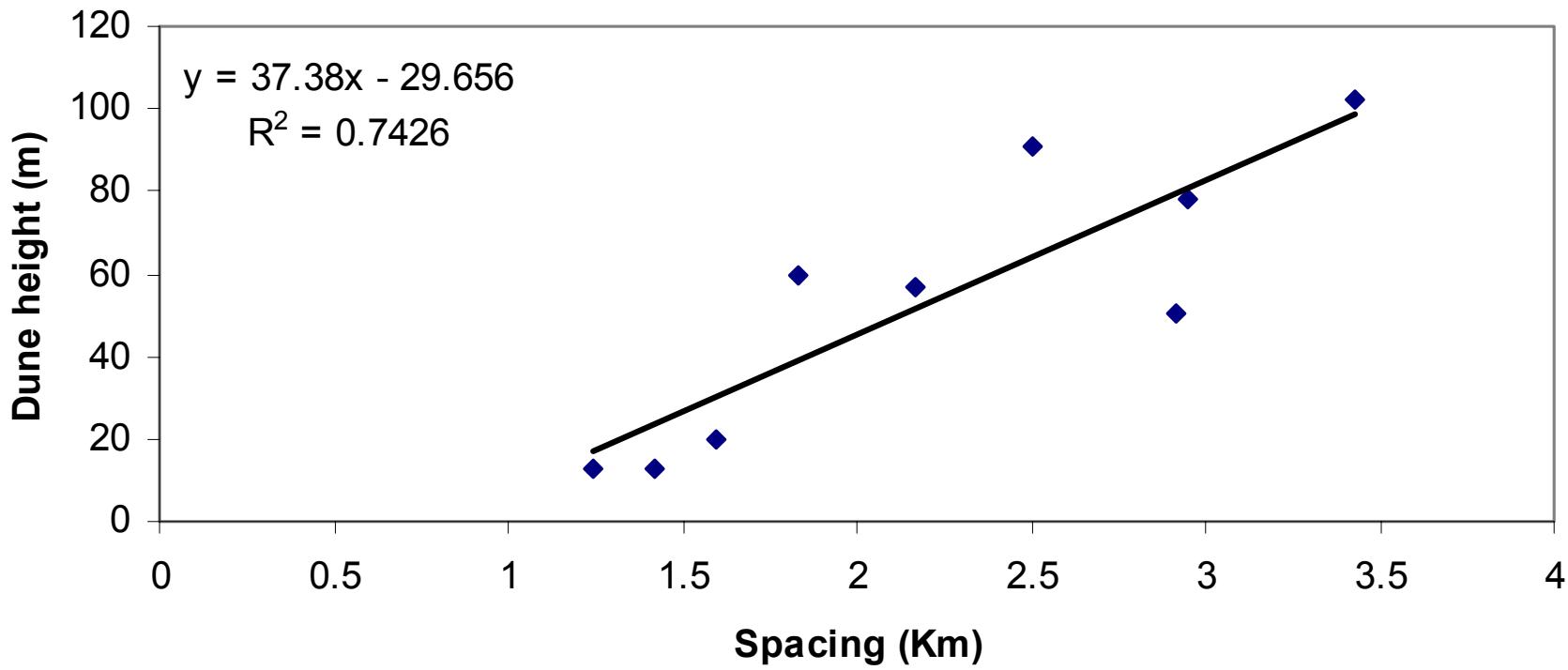


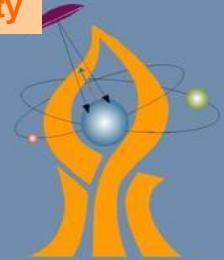
Results

Total >55,000 data points
Summarized into Ergs

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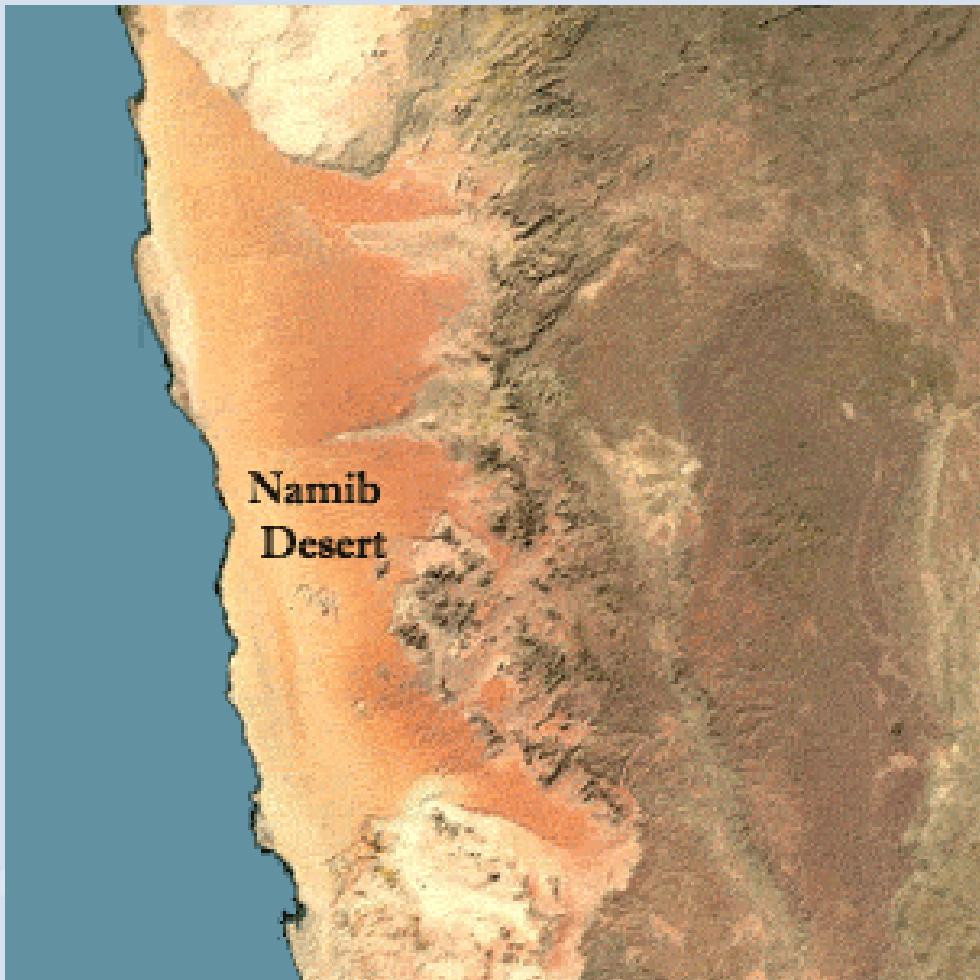
Linear ridges

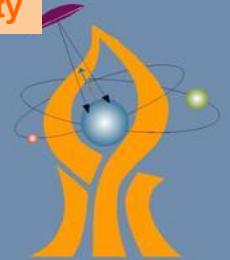




Namib Desert Dunes

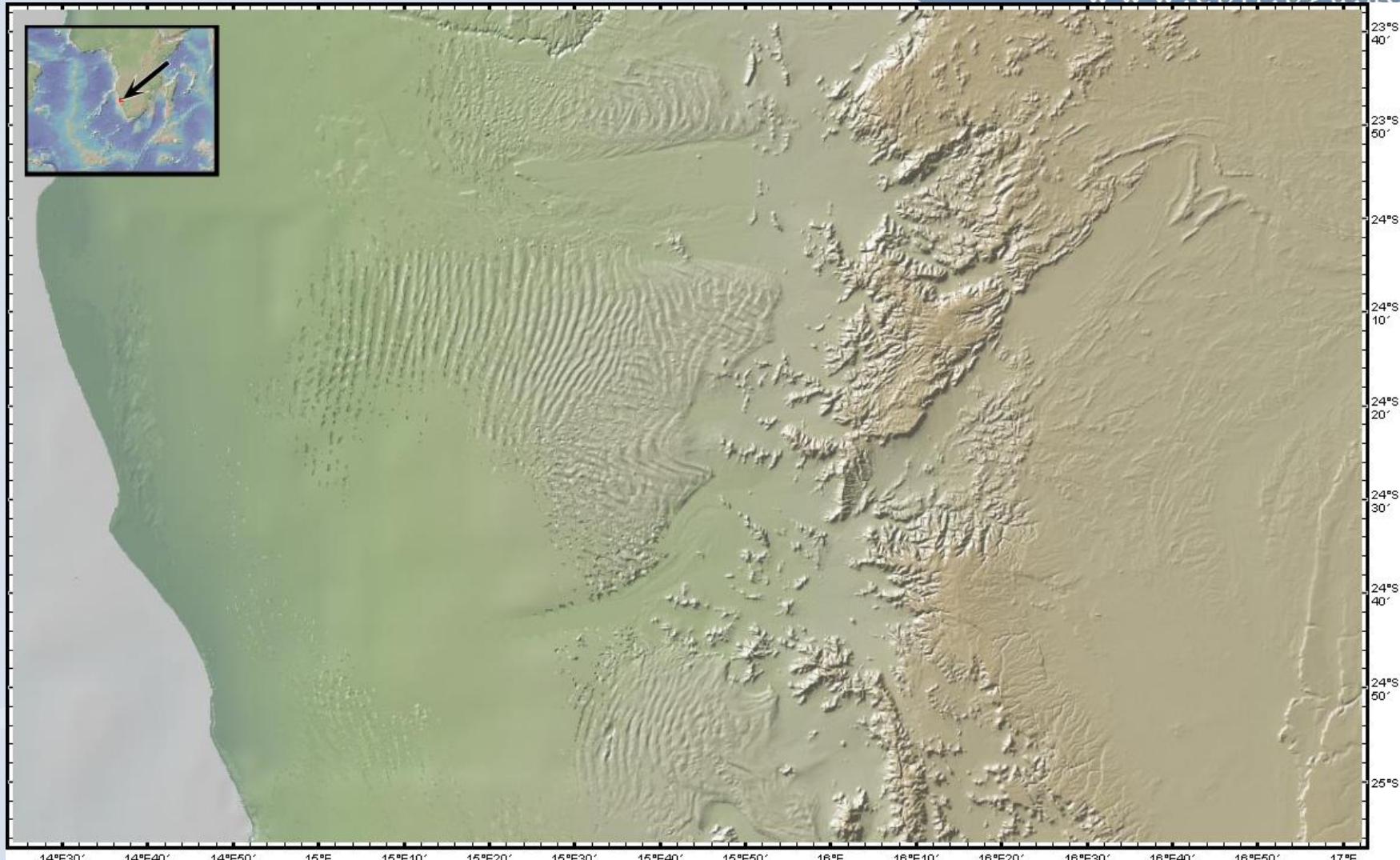
www.epif.bgu.ac.il

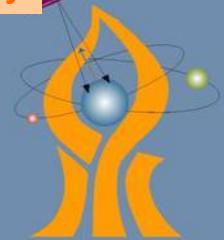




Namib Region

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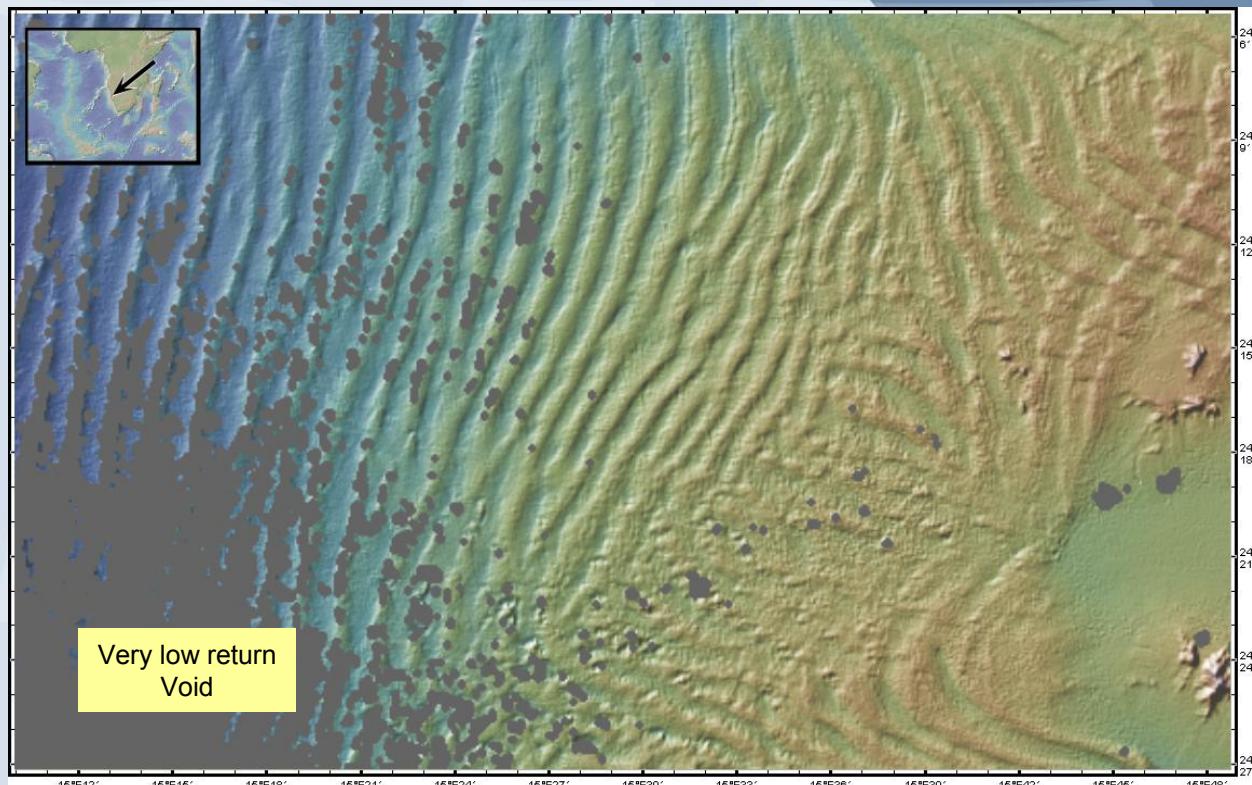


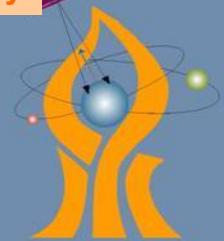
The voids

- Dunes are specular to most radar wavelengths causing low signal
- Or absorption

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Namib zoom in

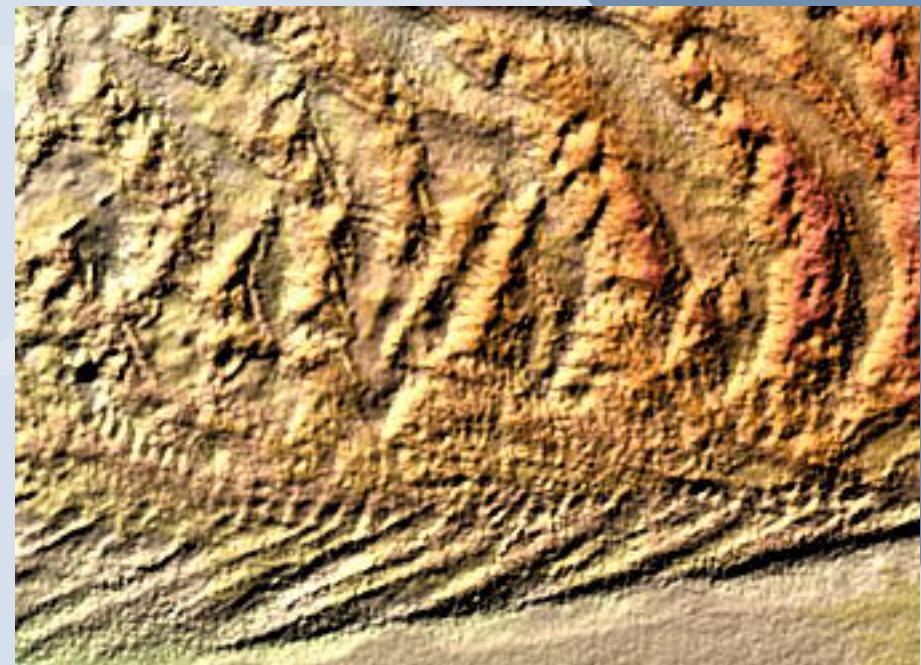
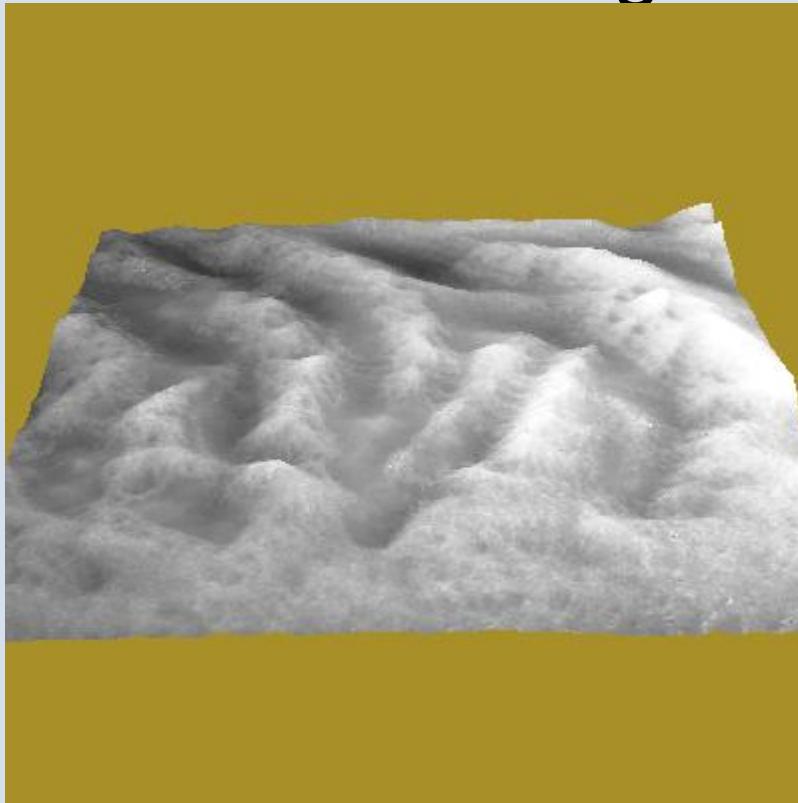


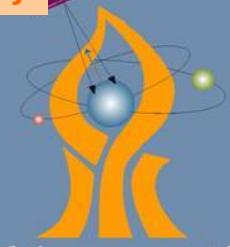


X-band 30m data of Namib

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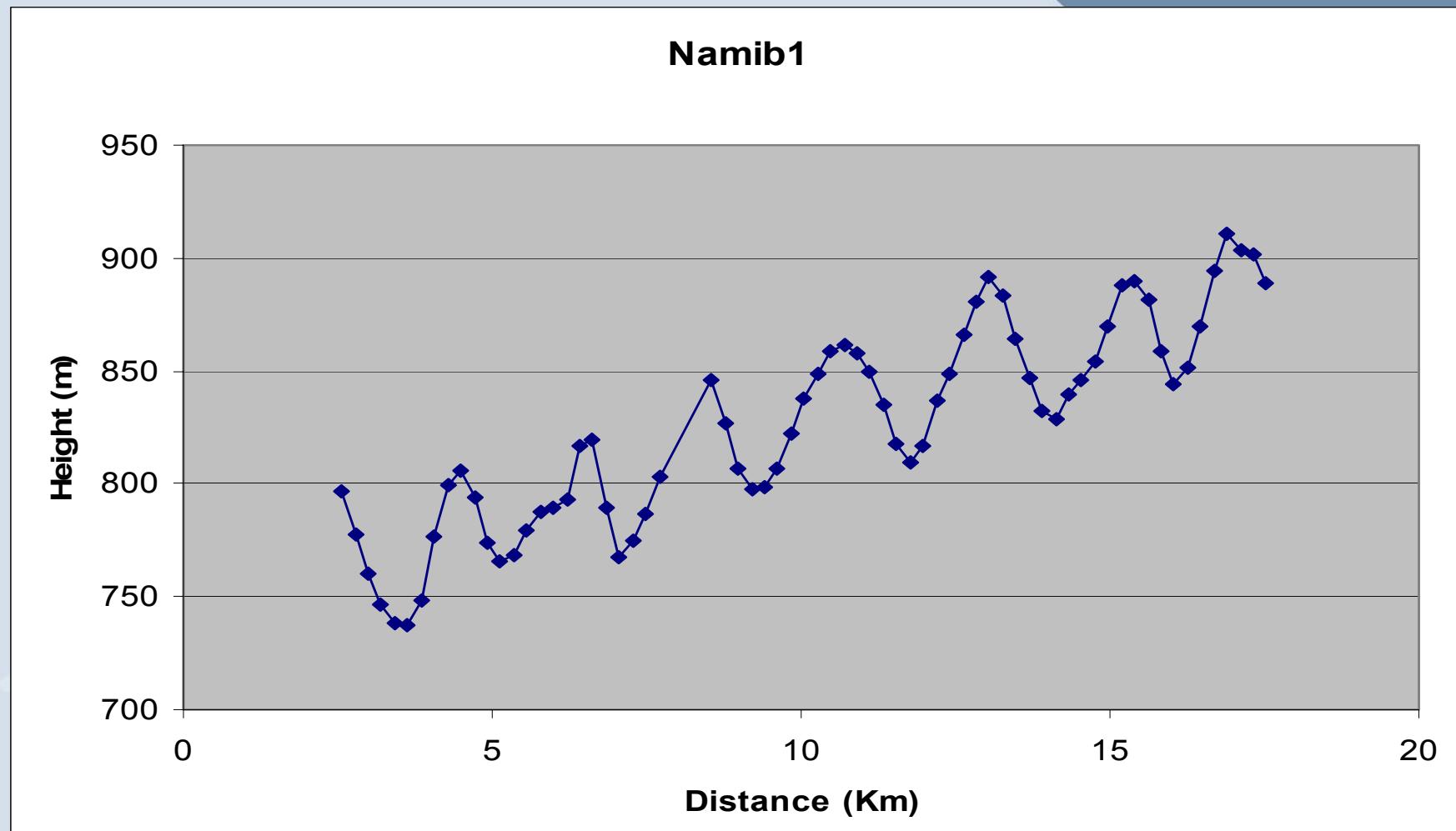
- Return is stronger and no voids in X-band dune coverage

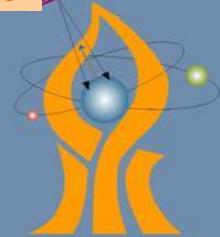




Namib cross section C-band

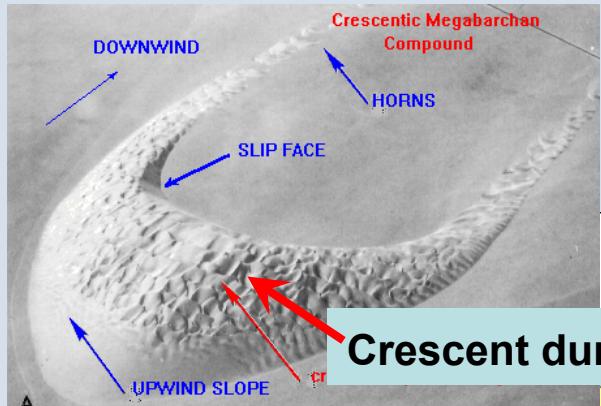
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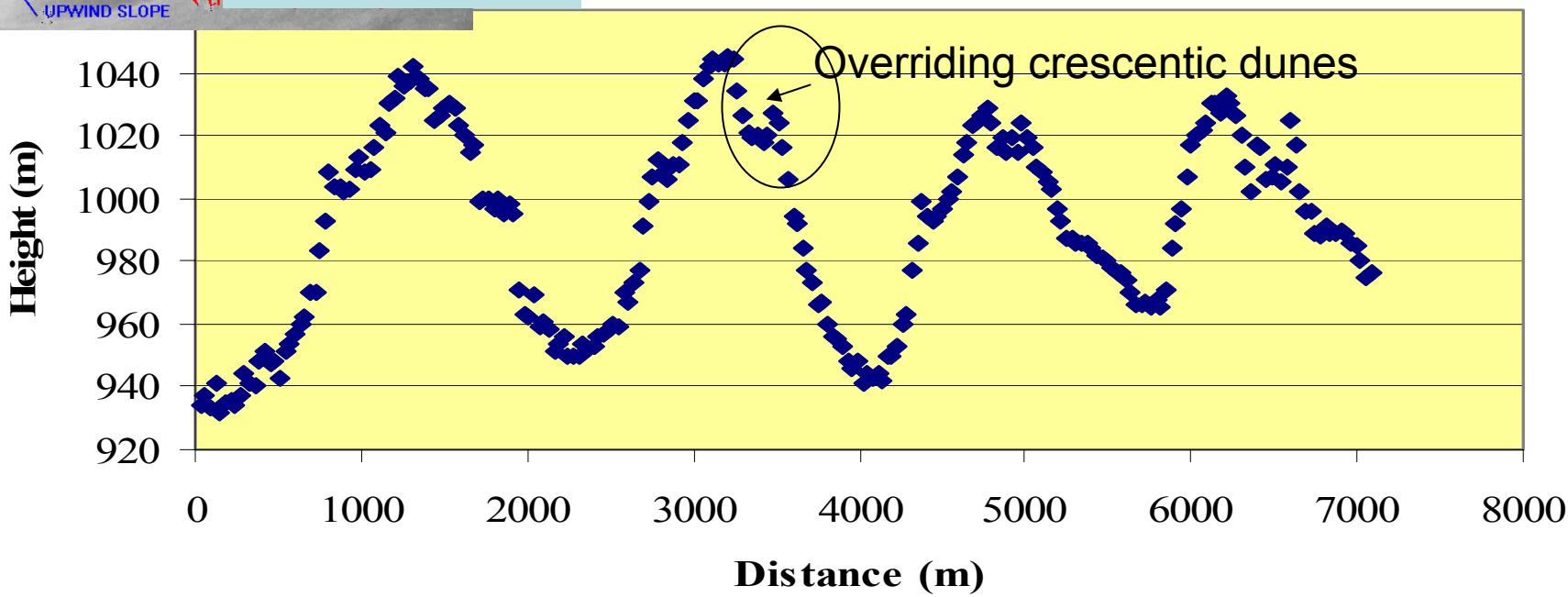


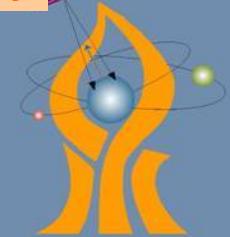
X-band cross section over complex dunes

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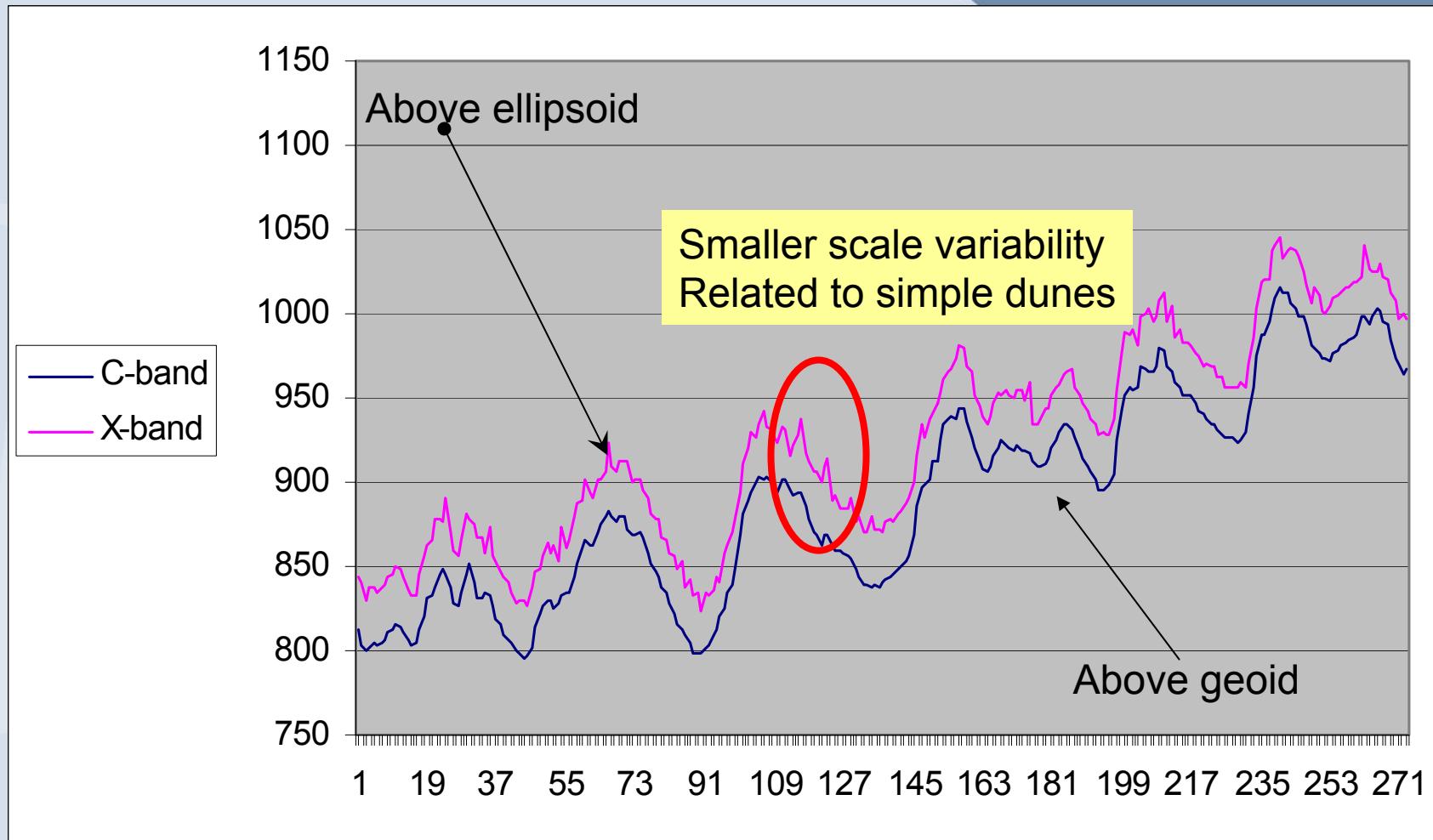
Namib dunes
Complex dunes





C-band vs. X-band complex dunes

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Differences between X and C-band

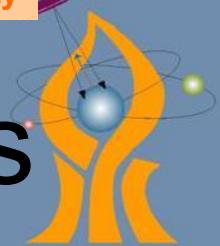
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Average Difference

	<i>Average Geoid</i>	<i>Elevation</i>	<i>After Correcting for geoid</i>	<i>Standard Dev.</i>
<i>Lamont</i>	-31.578	27.816	3.762	5.182
<i>Namibia</i>	32.391	30.748	2.046	4.665
<i>Sumatra</i>	-31.735	28.933	2.802	2.894

We had 13 desert calibration sites
Results for these not reported yet.

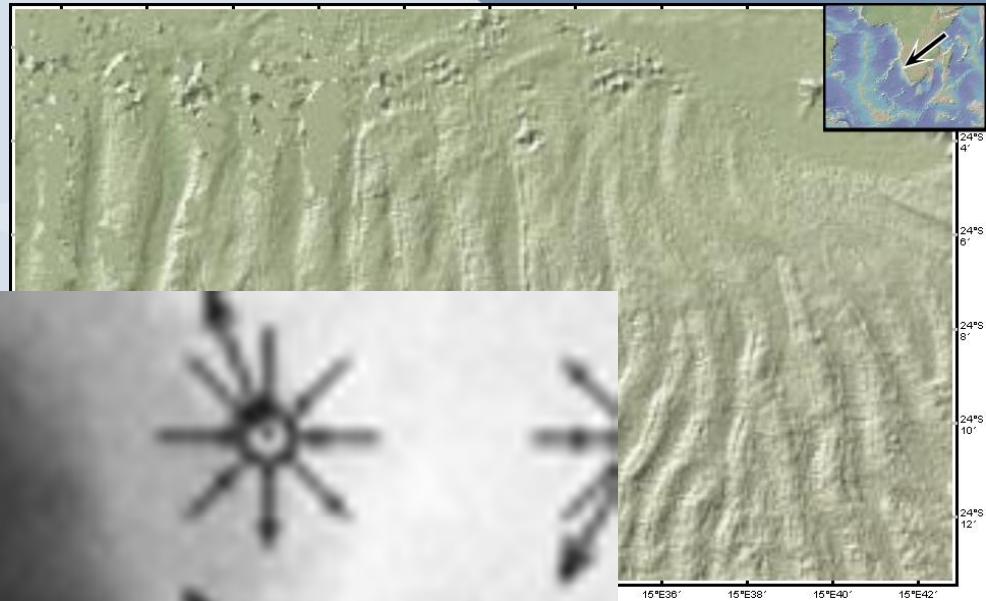




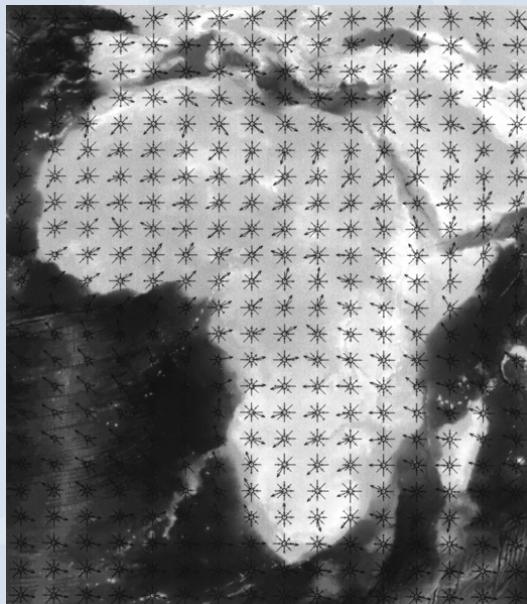
Use GCM for wind dynamics

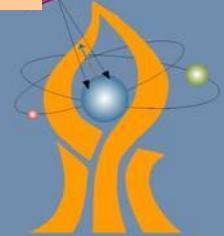
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- SRTM is a snapshot in time



Sand drift potential





Summary

- The larger dune forms (Mega dunes or Draas) can be mapped by SRTM
- 690 km of profiles were extracted for the dunes and plotted for height vs wavelength
- The height vs wavelength for linear and transverse is different but an overall correlation can be observed
- X-band and C-band show the smaller variability
- X-band vs. C-band have a ~2 m difference.

Thank you